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BEAUTY AND DESIGN IN NATURE.

(1) *Genetic Theory of Reality: being the Outcome of Genetic Logic as Issuing in the Æsthetic Theory of Reality called Pancalism.* With an extended glossary of terms. By Dr. J. M. Baldwin. Pp. xvii + 335. (New York and London: G. P. Putnam's Sons, 1915.) 7*s.* 6*d.* net.

(2) *The Natural Theology of Evolution.* By J. N. Shearman. Pp. xv + 288. (London: George Allen and Unwin, Ltd., n.d.) 10*s.* 6*d.* net.

(1) THIS book cannot be adequately reviewed without embarking more or less on an examination of the distinguished author's whole system as largely presented in his earlier monumental works. Moreover, being concerned with technical philosophy—though a philosophy which accepts and includes science—its appeal is primarily to readers other than those of this journal. It will suffice, therefore, to indicate briefly its scope and purport. The essence of the pancalistic doctrine is its emphasis on beauty. Science tells us what is true; that is science's prerogative. But the universe has beauty and goodness as well as truth. How reconcile and unify? The pancalistic answer is that the good and the true is so because it is beautiful. The final court of appeal is æsthetic. Nothing can be true without being beautiful, nor anything that is in any high sense good. The ascription of beauty, a reasoned, criticised, thought-out ascription of æsthetic quality, is the final form of our thought about nature, man, the world, the all. The volume under notice is an unfolding of this idea, dealing with the aspects of morphology, interpretation, religion (mysticism), and logic.

(2) An excellently written but somewhat diffuse restatement of Paley's argument for design. The author points out that the work of Darwin and his successors does not rule out design; it only requires the supposition that the designing mind works slowly, experimenting through many ages. As to those variations which have turned out failures—the flying reptiles and other extinct creatures of earlier periods—the author makes the suggestion that the direction of variation may to some extent be deputed by God to angels, in the same way as free-will and power is granted to man; and that these failures are the experiments of the angel-subordinates. But the author is not in the least a crank, and he puts forward this fresh and interesting hypothesis (which some would call fantastic) as a speculation only. His main point is that though the Darwinian natural selection is a true cause of change in species, the variations which tend to progress and greater complexity cannot be attributed to chance. They are evidence of a guiding mind which sees and knows before it produces on the material plane.

This, and the accompanying question of what we mean by "chance," is an extremely thorny problem, as the author indeed recognises. His treatment of it is lucid, sincere, and able, whether readers fully agree with it or not. Certainly there is a greater tendency among men of science at the present day to accept a philosophy of Platonic or idealistic type—which looks on Mind as the *prius*, and the material world a manifestation thereof—than at any time since modern scientific method appeared; and to many this very interesting volume will be welcome and useful. It deserves to be widely read.

LIME-SAND BRICKS AND ALLIED PRODUCTS.

Bricks and Artificial Stones of Non-plastic Materials: their Manufacture and Uses. By A. B. Searle. Pp. vi + 149. (London: J. and A. Churchill, 1915.) Price 8*s.* 6*d.* net.

AS intimated by the author in the preface, this book is intended: "(*a*) to supply reliable and unbiased information to those firms and individuals who contemplate making or buying bricks and artificial stones from non-plastic materials; (*b*) to assist manufacturers in solving the problems which occur in the course of their work, to enable them to remedy defects and to avoid other technical difficulties." In proceeding to carry out these objects, Mr. Searle treats in some detail the modes of production and uses of lime-sand bricks, clinker bricks, slag bricks, bricks made of crushed rock, concrete bricks and blocks, and various types of artificial stone, etc. As he points out, these products can often be made advantageously in districts where the manufacture of burnt bricks and tiles would be impracticable. Thus in some places the absence of suitable clay, or the want of a readily available supply of coal, would render any attempt to make bricks unprofitable; whilst, on the other hand, the presence in such a district of abundant deposits of sand might make the manufacture of lime-sand bricks perfectly feasible from a commercial viewpoint. It is even practicable in some cases for the two classes of products to be made side by side, the sand frequently found overlying the brick clays being beneficially utilised for the production of lime-sand bricks instead of being simply put away as so much waste material of no value.

A considerable amount of attention and space is devoted to a description of the raw materials,

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with their favourable and unfavourable characteristics, methods of preparing and mixing the ingredients (including some brief historical notices), the process of pressing, and the final process of hardening. The subjects of cost, of manufacture, and defects are dealt with in special chapters, as are also the physical properties of the products. The work is embellished with numerous illustrations depicting machinery and appliances suitable for properly carrying out the different kinds of operations.

Much of what is contained in the volume is based partly on the author's personal experiences, and partly on such experiences of other people as have come under his notice. This is in itself a highly commendable feature, but the author's confidently expressed opinions, assuming them to be well-founded, would lose none of their weight if the experimental data on which they are based were set forth more frequently than is the case.

There are a number of misprints, some of them trivial, but several may give rise to much doubt and perplexity. Apart from mere misprints, there are some loosely worded statements which would scarcely be expected from such an experienced writer as Mr. Searle appears to be, judging from the number of his published works. Thus, near the bottom of page 26, we are told that "the three essential ingredients—aggregate, lime, and water—*must be:* (1) *Ground* to the requisite fineness and graded (if necessary). (2) *The proper proportion* of each must be weighed or measured. (3) *Mixed* to form a homogeneous mass in which the lime is fully hydrated." The italics here are, of course, not the author's. Comment is scarcely necessary. It is not suggested that the meaning is obscure, but in quasi-scientific works on technical subjects there should be no flagrant flouting of grammatical rules. On page 82, line 18, 7 per cent. is mentioned instead of 0·7 per cent. There seems no valid reason for the spelling, in some of the later chapters, of "absorbtion" instead of the more orthodox "absorption." A curious mistake occurs at the bottom of the table on page 120, where the "cost of manufacture" of "cement-sand bricks" is stated to be "1 month." In the last sentence of the second paragraph on page 10, owing presumably to displacement of a comma, an absurd statement is made. It is true that the real meaning is rendered clear in the following paragraph, but a practised writer ought surely to guard against such slips.

The present writer has arrived at the conclusion that the author is less assailable as regards his treatment of the practical aspects of his subject than when dealing with more speculative questions. Thus, after giving in a tentative way the results of an analysis of the cementing material in non-plastic bricks, and suggesting a formula to correspond, he proceeds to apply this formula in a chemical equation to explain the reaction by which such cementing material is formed. The statement which accompanies it may constitute a fairly accurate general account of what takes place; but although more than one "if" is expressed or implied in the explanatory sentence, the equation somehow seems to suggest a more intimate knowledge of this particular reaction than is justified by the actual facts, as the author himself distinctly states more than once that the composition of the binding material is not definitely known. Again, in criticising the results of experimental work of F. F. Wright, performed at the Carnegie Institute, Mr. Searle goes so far as to assert that "if F. F. Wright had worked on a large scale and with better facilities, he would probably have realised that his experiments afford a much stronger confirmation of the composition suggested by the author of the present volume than they do of the existence of a zeolite, as the latter, so far as is known, do not possess cementitious properties." This may seem convincing to the author, but to a trained mind the conclusion is very far from being established, even when taking into account the experimental evidence by which he plausibly claims to prove the general accuracy of his conclusion.

With some reservation as regards certain of the matters to which attention has been directed, the work should prove useful for the objects the author had in mind when preparing it. One excellent feature worthy of mention is the comparison table occasionally introduced, showing in one view a number of more or less different processes, or the properties of a variety of different products, etc. There is also a serviceable index.

J. A. A.

THE PANAMA CANAL.

The Panama Canal: Comprising its History and Construction, and its Relation to the Navy, International Law, and Commerce. By R. E. Bakenhus, Capt. H. S. Knapp, and Dr. E. R. Johnson. Pp. xi+257. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1915.) Price 10*s.* 6*d.* net.

THIS book has a claim to authority. It consists essentially of a series of papers which were originally published in the Proceedings of the United States Naval Institute. Of the three authors the first, Mr. Bakenhus, is a member of the Corps of Civil Engineers of the United States Navy, the second, Capt. H. S. Knapp, U.S.N.,

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